Valorization of biomass waste from yellow horn (*Xanthoceras sorbifolia*) through the preparation of porous carbon for supercapacitors

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Hot trends have always been the successful production of green energies and the promotion of the added value of agricultural goods. In this research, we introduced a new type of porous carbon material which, after extracting oil from the Yellowhorn for high-performance supercapacitors, uses H_3PO_4 as an activator and is made from biomass waste. To date, experiments on nitrogen adsorption/desorption indicate that H_3PO_4 -activated bio-carbon has strong pore-forming potential, while the basic surface area is $1530.18 \text{ m}^2/\text{g}$. The average pore volume of is $0.97 \text{ cm}^3/\text{g}$. In contrast, carbon content electrochemical efficiency demonstrates a high specific capacitance of 246.5 F/g in 6 M KOH aqueous solution at 1 A/g . However, a high energy density of 34.24 Wh/kg is also provided by the proposed symmetrical supercapacitor. at a density of 500 W/kg of power. The above results thus suggest that the by-product of biomass waste is an outstanding substitute material for high-performance supercapacitor preparation.

Keywords: Yellowhorn; bio-carbon; supercapacitors; electrochemical performance

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